



A.D. 1870, 2nd DECEMBER.

N° 3167.

SPECIFICATION

OF

FRITZ HILLÉ.

MANUFACTURE OF DEODORIZING AND
DISINFECTING COMPOUNDS,
TREATMENT OF SEWAGE, &c.

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A.D. 1870, 2nd DECEMBER. N° 3167.

**Manufacture of Deodorizing and Disinfecting
Compounds, Treatment of Sewage, &c.**

LETTERS PATENT to Fritz Hillè, of Flora Villa, Brentford, in the County of Middlesex, for the Invention of “**IMPROVEMENTS IN THE MANUFACTURE OF DEODORIZING AND DISINFECTING COMPOUNDS, AND IN THE TREATMENT OF SEWAGE AND IMPURE WATERS, AND IN CLOSETS AND APPARATUS FOR THE TREATMENT OF SEWAGE.**”

Sealed the 16th May 1871, and dated the 2nd December 1870.

PROVISIONAL SPECIFICATION left by the said Fritz Hillè at the Office of the Commissioners of Patents, with his Petition, on the 2nd December 1870.

I, FRITZ HILLÈ, of Flora Villa, Brentford, in the County of Middlesex, do hereby declare the nature of the said Invention for “**IMPROVEMENTS IN THE MANUFACTURE OF DEODORIZING AND DISINFECTING COMPOUNDS, AND IN THE TREATMENT OF SEWAGE AND IMPURE WATERS, AND IN CLOSETS AND APPARATUS FOR THE TREATMENT OF SEWAGE,**” to be as follows:—

This Invention has for its object improvements in the manufacture of
10 deoderizing and disinfecting compounds, and in the treatment of sewage

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and impure waters, and in closets and apparatus for the treatment of sewage.

The disinfecting compound I prefer to use consists of lime, tar, chloride of magnesia, to which I put sometimes alum, chloride of calcium, or other ingredients which may be found useful for the purpose 5 in the locality such as clay. I manufacture this compound in casks, the size of which depends on the quantity of sewage I have to deal with. The casks are by preference filled with the compound, so that one cask shall last six or twelve, or twenty-four hours, according to the size of sewage works, and I prefer to manufacture the stuff once a 10 month, say forty casks altogether, more or less as to quantity required, for every day one or more casks, and sufficient reserve casks in case of rain or accidents. The cask may be placed where the sewage flows into a depositing tank, or before that point, and a stream of water be led against the open part of the cask, so as gradually to dissolve the 15 disinfecting agent. The solution of disinfectant is allowed to drop or flow into the sewage, and is thoroughly mixed therewith by means of an agitating wheel. The water employed to dissolve the disinfectant may be the water resulting from the purified sewage. By the use of casks to contain the disinfecting compound I reduce manual labour to 20 a minimum. The amount of disinfectant supplied to the sewage may be regulated by the employment of a tap to govern the stream of water or the force with which it flows against the compound, and the mixture will flow continuously into the sewage day and night without extra labor. 25

The following is the manner in which I manufacture the disinfecting compound:—Two hundred pounds of best chalk lime are slacked with about four hundred and fifty pounds of water, and when the lime is at the greatest heat, I introduce (where I take no special regard to the production of manure, and where I chiefly regard the sanitary point of the 30 question,) fifteen pounds of refined gas tar. These two are mixed so that every particle of the mixture is of the same greyish color, and that the tar has become entirely taken in by the lime. No oil must be visible on the top of the mixture otherwise the mixture, is not well made. When I have produced a homogeneous mass I introduce into it forty pounds 35 of calcined chloride of magnesia, dissolve beforehand in water, and if necessary a quantity of alum or of chloride of calcium. Then the stirring is continued till every particle of the two chlorides is dissolved.

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A final stirring is given and the mixture is then put into the casks, and is ready for use.

On the Sheet of Drawings annexed I have shewn an improved system of depositing tanks arranged according to my Invention. The cask containing the disinfectant is placed some one hundred paces from the inlet into the depositing tank, varying according to local circumstances. In the first compartment C, the agitator B mixes sewage and disinfectant thoroughly, and then the combined liquid goes through the different compartments C¹, C², C³, etc., and the pure water flows off at V after it has passed through a rough gravel filter C⁵. The tanks are, as will be seen by the different arrows in the annexed Drawing, constructed so that all the compartments may be used at the same time or separately, when for instance any of the compartments may want cleaning for the purpose of taking away and drying the residue. To separate the different compartments the sluices S are constructed. The bottom of the tanks are constructed on an incline, so that the residue is easily discharged through the valves E. This construction enables one to clean part of the tanks, while the other part remains in working order, and I arrive thus again at a minimum of labour. F is a small steam engine used to drive the agitator and to bring up the water to be let against the casks with the disinfecting compound; G are charcoal baskets which I prefer to use.

A great quantity of lime being required for effective disinfection, I prefer making the lime at the sewage works and using my own kilns, and of employing the carbonic acid arising from the process of lime production. The carbonic acid is introduced into the sewage after the disinfecting compound is added, and the purification produced thereby is very great. This introduction of carbonic acid for disinfecting purposes is a novelty in the treatment of sewage.

When the disinfecting compound is to be used in closets, I employ the following construction of closet. Below the seat of the closet is placed a trough to receive the excrements, one or more closets may be formed side by side in private houses, hotels, public buildings, hospitals, and fifty or more in military barracks, with one trough running along below the seat of such closets. The bottom of the trough is constructed with a fall towards its outlet, and whilst at the highest end of the trough a small iron grating is placed across it which cuts off and separates a small part of the trough. On this small compartment the disinfecting compound above described is placed in the shape of a thick paste, and

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is gradually dissolved by water being squirted on to it through a water cock. This disinfecting fluid covers the bottom of the trough to a suitable height, and fills the lower part of the same altogether. The excrements which fall into the trough remove a corresponding volume of the disinfecting fluid, the fluid being allowed to pass off through a bell trap to a suitable outlet, and in this way the same level is always kept. When after a time the trough becomes sufficiently filled the outlet is opened and all the excrements fall through a pipe either into a reservoir or are discharged into the sewers direct.

The great advantages of these closets are,—

10

1. With only a small quantity of water a state of salubrity can be obtained which it is impossible to reach when using the common water-closets and employing a great quantity of water.

2. A general introduction of these closets will most effectually prevent the spreading of contagious diseases, as disinfection takes place directly after or even during the use of the closet.

3. The precipitate collected in the reservoir will be a valuable manure which can be removed at any time, as it is free from smell. This manure will amply cover the cost of the disinfecting agent in any part of the country where a good manure is wanted.

20

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Fritz Hillè in the Great Seal Patent Office on the 2nd June 1871.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, FRITZ HILLÈ, of Flora Villa, Brentford, in the County of Middlesex, send greeting.

25

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Second day of December, in the year of our Lord One thousand eight hundred and seventy, in the thirty-fourth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Fritz Hillè, Her special license that I, the said Fritz Hillè, my executors, administrators, and assigns, or such others as I, the said Fritz Hillè, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time

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and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for “IMPROVEMENTS IN THE MANUFACTURE OF DEODORIZING
5 AND DISINFECTING COMPOUNDS, AND IN THE TREATMENT OF SEWAGE AND IMPURE WATERS, AND IN CLOSETS AND APPARATUS FOR THE TREATMENT OF SEWAGE,” upon the condition (amongst others) that I, the said Fritz Hillè, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe
10 and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Fritz Hillè, do hereby declare the
15 nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, that is to say :—

This Invention has for its object Improvements in the Manufacture of Deodorizing and Disinfecting Compounds, and in the Treatment of
20 Sewage and Impure Waters, and in Closets and Apparatus for the Treatment of Sewage.

On the Sheet of Drawings hereunto annexed I have shewn a system of depositing tanks and apparatus for treating the sewage of towns arranged according to my Invention.

25 Figure 1 is a plan view, and Figure 2 a longitudinal section taken through the line A, B, Figure 1; Figure 3 is a transverse section taken through the line C, D, Figure 1.

A is the inlet sewer by which the sewage is conducted to the purifying apparatus. On either side of this sewer reservoirs A^x may be formed to
30 receive any excess of sewage during storms or at night time. The sewage passing down this sewer has disinfecting material added to it at a distance, say, of about fifty yards from the entrance to the depositing tanks; it first enters into a chamber B, in which is a revolving agitator driven continuously in any suitable manner, so that the sewage and
35 disinfectant are intimately mixed one with the other. From the chamber B the mixed sewage and disinfectant flows through either one or other of the sluices C into the settling tanks D, D; these are divided by transverse partitions into numerous compartments, so as to con-

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siderably obstruct the flow of the sewage and allow the solid matters held in suspension to settle out of it. The arrangement of the partitions may be varied. In the Drawings the partitions near to the inlet are shewn to be of brickwork, and the sewage is either allowed to flow over them at the top or at one end, as shewn by the arrows in the Drawing. 5 The other partitions are of wooden boards, with spaces between the boards for the sewage to pass between. E, E, are self-acting floating outlets through which the purified sewage is led away through sluice valves F to the downward filters G, which are of any ordinary construction, such, for example, as now used by water companies for 10 filtering their water supply previous to pumping it into the supply mains. The sewage passing through the filter beds enters a chamber H, from which it is carried off by self-acting floating outlets K fitted with valves, by opening or closing which the speed of filtration can be governed. L is the outlet channel for conveying away the filtered 15 sewage; M, M, are lime kilns; N, engine and boiler; O, sludge well; P, pumping apparatus for raising sludge from the well on to a drying floor; Q, kilns for finally drying the solid matters in the sludge. The sludge which deposits in the settling beds D is conveyed to the sludge well through a sewer or channel R. An inlet into this channel is formed 20 from each settling bed, and the passage through each of these inlets is controlled by a sluice valve. The bottom also of each settling bed slopes downwards towards the channel R, so that any sludge collecting in the settling beds may readily be drawn off from it to the sludge well. Other passages not shewn in the Drawing are arranged along the two 25 outer sides of the system of settling tanks, so that when any of the compartments may want cleaning the sewage in place of passing into such compartment may be led into the compartment next to it. This construction enables me readily to clean any of the tanks or compartments while the others remain in working order, and by this means 30 the labor required for emptying the settling tanks or compartments is reduced to a minimum.

Another improvement in the treatment of sewage for the purpose of purifying it consists in forcing into the sewage, after disinfecting compound containing lime has been added to it, carbonic acid gas, whereby 35 the lime is precipitated, carrying down with it the impurities in the sewage, and then I subsequently add to the sewage a small portion of milk of lime or other disinfectant. By this means a very high degree of purification is obtained.

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When a disinfecting compound such as herein-after described is employed, and which is largely composed of lime, I prefer to burn the lime at the sewage works, and to employ the carbonic acid and other gas arising from the lime-burning process. To introduce these gases
5 into the sewage I prefer to force them by means of a fan into a perforated pipe laid along one of the settling beds D of the apparatus before described.

I claim the combined arrangement herein-before described of a system of settling tanks, each communicating with a sewer or channel by which
10 the sludge settling in it may be carried off into a sludge well, so that the settling tanks can readily and quickly be cleaned.

I also claim the general arrangement or combination of apparatus for treating sewage, substantially as herein-before described.

I also claim the employment of carbonic acid gas in the purification of
15 sewage, substantially as herein-before described.

The disinfecting compound I use for disinfecting the sewage may be a different one according to the locality and local circumstances. I prefer to use lime in combination with chloride of zinc, or chloride of calcium or salts of magnesia, such as chloride of magnesia, and I some-
20 times use additionally refined gas tar. I manufacture this compound for use either in a liquid form or as a dry compound in casks or cakes, the size of which depends on the quantity of sewage I have to deal with or on the effect I intend to produce. If the disinfecting compound be used in a liquid form it is manufactured immediately before employing
25 it; if in casks the casks are by preference filled with the compound, so that one cask shall last six or twelve or twenty-four hours according to the size of the sewage tanks; and I prefer for such use to manufacture the stuff once a month, and such number of casks as the quantity of sewage to be dealt with may require, for every day one or more casks, and
30 sufficient reserve casks in case of rain or accidents. The casks may be placed where the sewage flows into a depositing tank, or before that point, and a stream of water may be led against the open part of the cask so as gradually to dissolve the disinfecting agent. The solution of disinfectant is allowed to drop or flow into the sewage, and is thoroughly mixed there-
35 with by means of an agitating wheel. The water employed to dissolve the disinfectant may be the water resulting from the purified sewage. By the use of casks to contain the disinfecting compound I reduce manual labor to a minimum. The amount of disinfectant supplied to

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the sewage may be regulated by the employment of a tap to govern the stream of water or the force with which it flows against the compound, and the mixture will flow continuously into the sewage day and night without extra labor. I prefer to use the disinfectant in form of bricks of different size for urinals, closets, and such like at railway stations, 5 closets in private houses, or public buildings, such as military barracks, hospitals, theatres, hotels, and the like, and a considerable advantage may be obtained by the employment of my disinfectant in the holds of ships for transport of cattle or other living freight.

The following is the manner in which it is preferred to manufacture 10 the disinfecting agent:—I prefer to use the best chalk lime as the base of my compound, and this lime is slacked with sufficient water (the water used for this purpose may be purified sewage water) to produce a kind of paste sufficiently soft enough to be handled with a spade; and when the slacked lime possesses the highest temperature such other 15 ingredients as chloride of zinc or chloride of calcium or salts of magnesia, such as chloride of magnesia, may be added as are readily obtained in the locality. It is essential that this addition, either in a dissolved or undissolved state of the respective ingredients, be made at the highest temperature of the lime so as to produce the greatest possible efficiency 20 of the disinfectant. In cases where it is intended to keep the off-flowing water for a long time in tanks, cisterns, or reservoirs, or during very hot summer weather, I sometimes make a further addition of refined gas tar to the disinfectant before introducing into the lime one or the other of the above-named chemicals. If tar be added to the lime this should be 25 done as well at the time of the highest temperature, and these two ought to be mixed in such a way that every particle of the mixture is of the same greyish color, and that the refined tar has become entirely taken in by the lime. No oil must be visible on the top of the mixture, otherwise the mixture is not well made. When a homogeneous mass of the 30 different ingredients has been obtained the stirring is continued till every particle of the ingredients is dissolved. If the disinfectant is to be employed in a liquid form, then to every pound of this mixture ten to fifteen lbs. of water—the water used may again be the purified sewage water—is to be added in proportion, the whole well stirred up so as to form a 35 thorough good alike mixture, and the disinfectant is ready for use. If used in this way I prefer the employment of galvanised iron tanks, holding from 500 to 1000 gallons, fitted with agitating wheels driven by

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machinery of the simplest kind as being of great advantage, combining economy and simplicity. The quantity of the disinfectant and purifying compound required for complete, effective, and lasting deodorization of sewage or other impure waters depends upon the quantity as well as the
5 quality of such waters, and averages from half to five lbs. of disinfecting compound for every one thousand lbs. of sewage water to be purified, according to the more or less putrified state of sewage and its organic contents. The introduction of the disinfectant into the sewage, as far as the necessary quantity is concerned, can be easily regulated by proper
10 taps fitted into the bottom or the sides of the iron cylinders. If the disinfectant is to be used in a dry form in casks the above mixture without the extra addition of water is put into the casks, and the casks are filled with it. Casks of perforated thin iron at the bottom I prefer for continual use; this allows any water remaining in the disinfecting com-
15 pound from the operation of slacking the lime to run off through the bottom of the cask. When the casks have been standing for twenty-four hours they are ready for use, and may be placed with their open part over the inlet of the sewer or depositing tanks. If the disinfectant is to be used in a dry form in bricks the disinfectant is formed into bricks of such
20 size as may be required. The bricks for use are placed in the urinals or such, after these have been thoroughly cleansed, so that no old urinal matter is left in the urinals, and they dissolve gradually by absorbing the water employed generally in urinals. The use of these bricks inside of the sewers between iron gratings inserted in the bottom part of the
25 sewers will be found of the greatest advantage in not only disinfecting the sewage but in purifying the air in the sewers, and thus preventing the escape of any foul gases or foul air into the atmospheric air. The bricks may simply be put between the iron gratings and renewed when dissolved.

30 I will now describe my improved construction of closet:—Below the seat of the closet is constructed a trough to receive the excrements. One or more closets may be formed side by side in private houses, hotels, public buildings, hospitals, and fifty or more in military barracks, with one trough running along below the seat of such closets. The bottom of
35 the trough is constructed with a fall towards its outlet, and whilst at the highest end of the trough a small iron grating is placed across it which cuts off and separates a small part of the trough. In this small compartment the disinfecting compound above described is placed in the

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shape of a thick paste or in bricks, and is gradually dissolved by water being squirted on to it through a water-cock. This disinfecting fluid covers the bottom of the trough to a suitable height, and fills the lower part of the same altogether. The excrements which fall into the trough remove a corresponding volum of the disinfecting fluid, the fluid being 5 allowed to pass off through a bell trap to a suitable outlet, and in this way the same level is always kept. When after a time the trough becomes sufficiently filled the outlet is opened and all the excrements fall through a pipe either into a reservoir or are discharged into the sewers direct. These closets have very great advantages. With only a 10 small quantity of water a state of salubrity can be obtained which it is impossible to reach when using the common waterclosets and employing a great quantity of water. A general introduction of these closets will most effectually prevent the spreading of contagious diseases, as disinfection takes place directly after or even during the use of the closet. 15 The precipitate collected in the reservoir will be a valuable manure, which can be removed at any time, as it is free from smell. This manure will amply cover the cost of the disinfecting agent in any part of the country where a good manure is wanted.

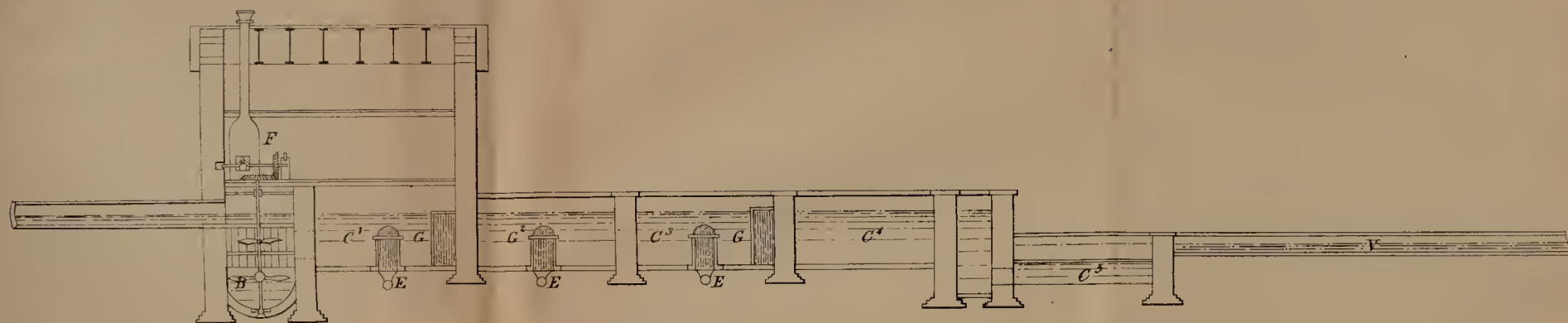
I claim as regards this part of my Invention the construction of closets 20 substantially as herein-before described.

In witness whereof, I, the said Fritz Hillè, have hereunto set my hand and seal, this Thirty-first day of May, in the year of our Lord One thousand eight hundred and seventy-one.

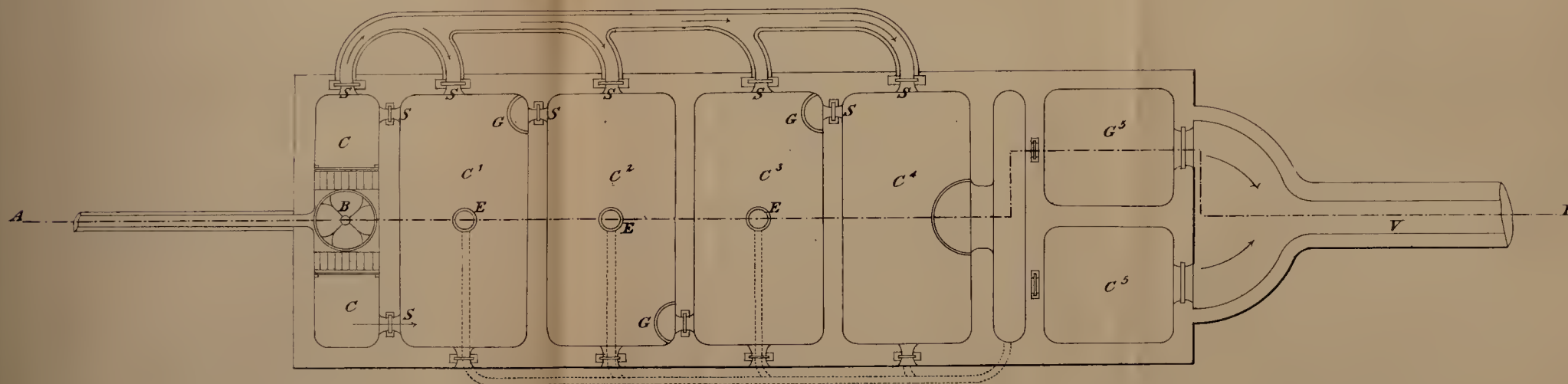
F. HILLÈ. (L.S.)

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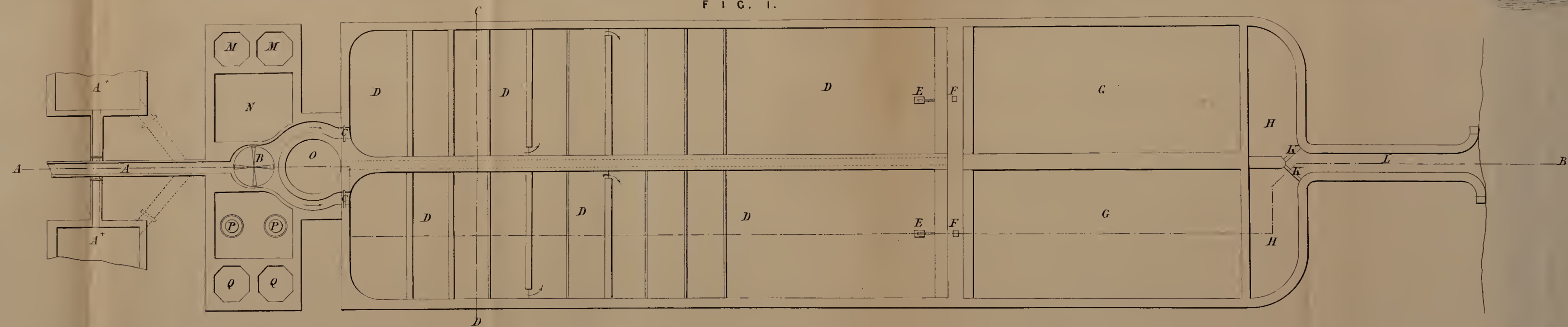
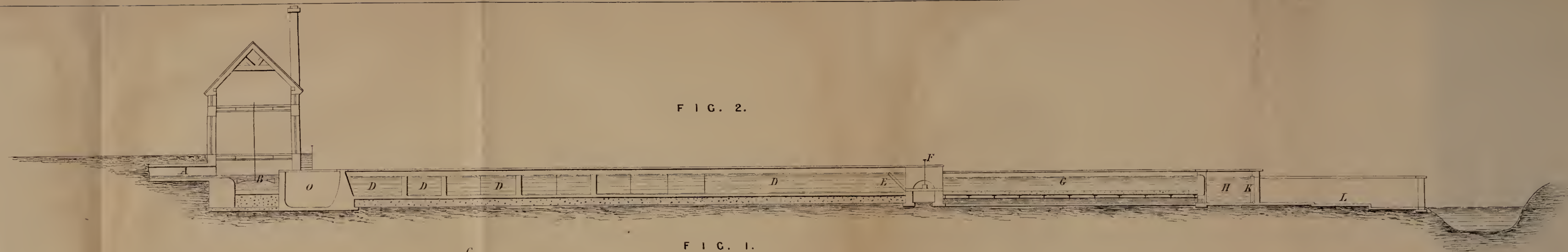
Section at A.B.



Plan at Water line

The drawing left with Provisional Specification is partly colored.

Drawn on Stone by Mally & Sons



The tiled drawing is partly colored.

Drawn on Stone by Mathey & Son.

